

**WHAT IS CLAIMED IS:**

1. A semiconductor device comprising:  
a gate insulating film having a multilayer structure including a zirconium oxide film and a high dielectric constant film which is formed of an oxide of a metal other than  
5 zirconium and stacked on the zirconium oxide film.
2. The semiconductor device of claim 1, wherein the high dielectric constant film is a hafnium oxide film, a hafnium silicate film, or a hafnium aluminate film.
- 10 3. The semiconductor device of claim 1, wherein the high dielectric constant film contains nitrogen.
4. The semiconductor device of claim 1, wherein the gate insulating film includes a zirconium silicate film formed under the zirconium oxide film.
- 15 5. A method for fabricating a semiconductor device comprising the steps of:  
depositing a zirconium metal film on a silicon region;  
depositing a high dielectric constant film of an oxide of a metal other than zirconium on the zirconium metal film; and  
20 forming a conductive film on the high dielectric constant film and then patterning the conductive film, thereby forming an electrode.
6. The method of claim 5, wherein the zirconium metal film contains nitrogen.
- 25 7. The method of claim 5, wherein the zirconium metal film has a thickness of not

less than 0.5 nm and not more than 1.5 nm when it is deposited.

8. The method of claim 5, wherein the high dielectric constant film is a hafnium oxide film, a hafnium silicate film, or a hafnium aluminate film.

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9. The method of claim 5, wherein the high dielectric constant film contains nitrogen.

10. The method of claim 5, wherein the high dielectric constant film has a thickness of not less than 1.0 nm and not more than 5.0 nm when it is deposited.

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11. The method of claim 5, further comprising the step of performing thermal treatment to the high dielectric constant film.

12. The method of claim 5, further comprising, before the step of depositing a zirconium metal film, the step of forming a silicon nitride film on the silicon region.

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13. The method of claim 12, wherein the step of forming a silicon nitride film includes performing thermal treatment to the silicon region in an ammonia atmosphere or an ammonia plasma atmosphere.

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14. The method of claim 5, wherein in the step of depositing a zirconium metal film, sputtering or CVD is used.

15. The method of claim 5, wherein in the step of depositing a high dielectric

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constant film, sputtering or CVD is used.

16. The method of claim 5, wherein the thermal treatment is performed to the high dielectric constant film in a plasma atmosphere composed of a gas containing at least one  
5 of oxygen, ozone, and nitrogen oxide.

17. The method of claim 5, wherein the thermal treatment is performed to the high dielectric constant film in an atmosphere containing at least one of oxygen, ozone, and nitrogen oxide to which ultraviolet rays have been irradiated.  
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18. The method of claim 5, wherein the thermal treatment is performed to the high dielectric constant film in an atmosphere containing at least one of nitrogen, oxygen, nitrogen oxide, argon, and hydrogen.

15 19. A semiconductor device comprising:  
a gate insulating film having a multilayer structure in which a first high dielectric constant film formed of an oxide of a first metal having relatively high oxygen absorption properties and a second dielectric film formed of an oxide of a second metal having relatively low oxygen absorption properties on the first dielectric film.

20 20. A method for fabricating a semiconductor device, comprising the steps of:  
depositing a metal film formed of a first metal having relatively high oxygen absorption properties on a silicon region;  
depositing a high dielectric constant film formed of an oxide of a second metal  
25 having relatively low oxygen absorption properties on the metal film; and

forming a conductive film on the high dielectric constant film and then patterning the conductive film, thereby forming an electrode.